

CLAIM AMENDMENTS

1. (currently amended): A porous particulate composition comprising a matrix of one or more catalytic components and at least one olefin-based material having a plurality of free olefin groups, wherein the catalyst component is an organometallic complex selected from the group consisting of Group 3-10 metals, non-metals, lanthanide metals, actinide metals and combinations thereof [[the olefin-based material further comprising an organic material having a plurality of free olefin groups;]] and wherein the matrix is formed by reaction of the catalytic component and the free olefin groups of the olefin-based material.
2. (previously amended): The composition of claim 1, wherein the olefin-based material is a macroporous polymer prepared in the presence of a porogen and is selected from the group consisting of divinylbenzene polymers, divinylbenzene copolymers, styrene/divinylbenzene copolymers, divinylbenzene resins, cross-linked divinylbenzene polymers, styrene/butadiene copolymers, styrene/isoprene copolymers, vinylsiloxane polymers, alkylsiloxane polymers and combinations thereof; and wherein the free olefin groups are optionally disposed on the surface of the olefin-based material.
3. (original): The composition of claim 1, wherein the olefin based material is prepared by incorporating a plurality of free olefin groups into a solid selected from the group consisting of silica, silica polymorphs, alumina, alumina polymorphs, magnesia, magnesia polymorphs, siloxanes, alumoxanes, alkylalumoxanes, alkylsiloxanes, aluminosilicates, clays,

zeolites and combinations thereof; the olefin-based material optionally having the free olefin groups disposed on the surface of the solid.

4. (original): The composition of claim 1, wherein the catalytic component is selected from the group consisting of olefin polymerization catalysts, Ziegler-Natta catalysts, metallocene complexes of Group 3-10 metals, metallocene complexes of non-metals, metallocene complexes of lanthanide metals, metallocene complexes of actinide metals, single-site catalysts, single site metallocene catalysts, and combinations thereof; and wherein the matrix further comprises a plurality of catalytic components, at least one activator component and is used for polymerizing at least one olefin monomer selected from the group consisting of unbranched aliphatic olefins having from 2 to 12 carbon atoms, branched aliphatic olefins having from 4 to 12 carbon atoms, unbranched and branched aliphatic  $\alpha$ -olefins having from 2 to 12 carbon atoms, conjugated olefins having 4 to 12 carbon atoms, aromatic olefins having from 8 to 20 carbons, unbranched and branched cycloolefins having 3 to 12 carbon atoms, unbranched and branched acetylenes having 2 to 12 carbon atoms, and combinations thereof.

5. (original): The composition of claim 1, wherein the matrix is represented by a formula  $[Cp^1Cp^2MR_x L]^+ [NCA]^-$ , wherein M is a Group 4 metal,  $Cp^1$  is a substituted or non-substituted cyclopentadienyl ring and  $Cp^2$  is the same or different, substituted or non-substituted cyclopentadienyl ring and may be bridged symmetrically or asymmetrically to  $Cp^1$ , R is hydride, alkyl, silyl, germyl or an aryl group, x is an integer equal to 0 or 1, L is an olefin-based material and NCA is a non-coordinating anion; or the matrix is represented by a formula  $[Cp^1Cp^2MR]^+ [NCA]^-$ , wherein M is a Group 4 metal,  $Cp^1$  is a substituted or non-substituted cyclopentadienyl ring and  $Cp^2$  is the same or different, substituted or non-substituted cyclopentadienyl ring and may be

bridged symmetrically or asymmetrically to Cp<sup>1</sup>, R is a hydrocarbyl group derived from the hydrozirconation of an olefin-based material and NCA is a non-coordinating anion; or the matrix is represented by a formula [Cp<sup>1</sup>MR<sub>x</sub>L]<sup>+</sup> [NCA]<sup>-</sup>, wherein M is a Group 4 or 6 metal, Cp<sup>1</sup> is a substituted or non-substituted cyclopentadienyl ring, R is a hydride, alkyl, silyl, germyl or an aryl group, x is an integer ranging from 0 to 6, L is an olefin-based material and NCA is a non-coordinating anion; or the matrix is represented by a formula [(Multidentate)MR<sub>x</sub>L]<sup>+</sup> [NCA]<sup>-</sup>, wherein M is a Group 4 or 6 or 8 or 9 or 10 metal, R is hydride, alkyl, silyl, germyl, aryl, halide or alkoxide group, x is an integer equal to 0, 1 or 2, multidentate is a bidentate, tridentate or tetridentate ligand containing nitrogen, sulfur, phosphorus and/or oxygen as coordinating atoms to the metal, L is an olefin-based material and NCA is a non-coordinating anion; or the matrix is represented by a formula (Multidentate)MR<sub>x</sub>L, wherein M is a Group 4 or 6 or 8 or 9 or 10 metal, R is hydride, alkyl, silyl, germyl, aryl, halide or alkoxide group, x is an integer equal to 0, 1 or 2, multidentate is a bidentate, tridentate or tetridentate ligand containing nitrogen, sulfur, phosphorus and/or oxygen as coordinating atoms to the metal and L is an olefin-based material; or the matrix is represented by a formula (Cp<sup>1</sup>)<sub>x</sub>(Cp<sup>2</sup>)<sub>y</sub>MR<sub>x</sub>L<sup>+</sup>[NCA]<sup>-</sup>, wherein M is a lanthanide or an actinide metal, R is hydride, alkyl, silyl, germyl, aryl, halide, alkoxide, amide or solvent ligand, R may also be a bidentate ligand containing nitrogen, sulfur, phosphorus and/or oxygen, x = 0-2, y = 0-2, L is an olefin-based material and NCA is a non-coordinating anion.

6. (original): The composition of claim 1, wherein the matrix is prepared from olefin-based materials having particle diameters ranging from 5 nm to 1000  $\mu$ m.

7. (withdrawn per restriction): An olefin polymerization process that comprises the steps of contacting at least one olefin monomer and a composition comprising a matrix of one or more catalytic components and at least one olefin-based material, wherein the catalyst component is an organometallic complex selected from the group consisting of Group 3-10 metals, non-metals, lanthanide metals, actinide metals and combinations thereof, the olefin-based material further comprising an organic material having a plurality of free olefin groups and wherein the matrix is formed by reaction of the catalytic component and the free olefin groups of the olefin-based material; and polymerizing the olefin monomer to produce a polyolefin.

8. (withdrawn per restriction): The process according to claim 7, wherein the olefin monomer is selected from the group consisting of unbranched aliphatic olefins having from 2 to 12 carbon atoms, branched aliphatic olefins having from 4 to 12 carbon atoms, unbranched and branched aliphatic  $\alpha$ -olefins having from 2 to 12 carbon atoms, conjugated olefins having 4 to 12 carbon atoms, aromatic olefins having from 8 to 20 carbons, unbranched and branched cycloolefins having 3 to 12 carbon atoms, unbranched and branched acetylenes having 2 to 12 carbon atoms, and combinations thereof; and wherein the olefin monomer is a polar olefin monomer having from 2 to 12 carbon atoms and at least one atom selected from the group consisting of O, N, B, Al, S, P, Si, F, Cl, Br and combinations thereof.

9. (withdrawn per restriction): The process according to claim 7, wherein the olefin monomer is selected from the group consisting of ethylene, propene, 1-butene, 1-hexene, butadiene, styrene, alpha-methylstyrene, cyclopentene, cyclohexene, cyclohexadiene, norbornene, norbornadiene, cyclooctadiene, divinylbenzene, trivinylbenzene, acetylene, diacetylene, alkynylbenzene,

dialkynylbenzene, ethylene/1-butene, ethylene/isoprene, ethylene/1-hexene, ethylene/1-octene, ethylene/cyclopentene, ethylene/cyclohexene, ethylene/butadiene, ethylene/hexadiene, ethylene/styrene, ethylene/acetylene, propene/1-butene, propene/styrene, propene/butadiene, propene/1,6-hexadiene, propene/acetylene, ethylene/propene/1-butene, ethylene/propene/1-hexene, ethylene/propene/1-octene, and combinations thereof.

10. (withdrawn per restriction): The process according to claim 7, wherein the polymerization is selected from the group consisting of a copolymerization of ethylene and higher  $\alpha$ -olefins, a copolymerization of propene and higher  $\alpha$ -olefins, and a copolymerization of styrene and higher  $\alpha$ -olefins.

11. (withdrawn per restriction): The process according to claim 7, wherein the polyolefin produced is selected from the group consisting of HDPE, LDPE, LLDPE, polyolefins incorporating a plurality of olefin monomers, polyolefins incorporating  $\alpha$ -olefins, copolymers of ethylene and  $\alpha$ -olefins selected from the group consisting of 1-butene, 1-hexene and 1-octene, stereospecific polyolefins, stereoregular polyolefins, and polyolefins having stereospecific structures selected from the group consisting of atactic, isotactic, syndiotactic, hemi-isotactic and stereoregular blocks and combinations thereof.

12. (withdrawn per restriction): The process according to claim 7, wherein a polyolefin particle essentially retains the shape of a prepared matrix particle.

13. (withdrawn per restriction): The process according to claim 7, wherein the catalytic component is selected from the group consisting of olefin

polymerization catalysts, Ziegler-Natta catalysts, metallocene complexes of Group 3-10 metals, metallocene complexes of non-metals, metallocene complexes of lanthanide metals, metallocene complexes of actinide metals, single-site catalysts, single site metallocene catalyst and combinations thereof; wherein the matrix further comprises a plurality of catalytic components and at least one activator component; and wherein the matrix is represented by a formula  $[Cp^1Cp^2MR_xL]^+ [NCA]^-$ , wherein M is a Group 4 metal,  $Cp^1$  is a substituted or non-substituted cyclopentadienyl ring and  $Cp^2$  is the same or different, substituted or non-substituted cyclopentadienyl ring and may be bridged symmetrically or asymmetrically to  $Cp^1$ , R is hydride, alkyl, silyl, germyl or an aryl group, x is an integer equal to 0 or 1, L is an olefin-based material and NCA is a non-coordinating anion; or the matrix is represented by a formula  $[Cp^1Cp^2MR]^+ [NCA]^-$ , wherein M is a Group 4 metal,  $Cp^1$  is a substituted or non-substituted cyclopentadienyl ring and  $Cp^2$  is the same or different, substituted or non-substituted cyclopentadienyl ring and may be bridged symmetrically or asymmetrically to  $Cp^1$ , R is a hydrocarbyl group derived from the hydrozirconation of an olefin-based material and NCA is a non-coordinating anion; or the matrix is represented by a formula  $[Cp^1MR_xL]^+ [NCA]^-$ , wherein M is a Group 4 or 6 metal,  $Cp^1$  is a substituted or non-substituted cyclopentadienyl ring, R is a hydride, alkyl, silyl, germyl or an aryl group, x is an integer ranging from 0 to 6, L is an olefin-based material and NCA is a non-coordinating anion; or the matrix is represented by a formula  $[(\text{Multidentate}) MR_xL]^+ [NCA]^-$ , wherein M is a Group 4 or 6 or 8 or 9 or 10 metal, R is hydride, alkyl, silyl, germyl, aryl, halide or alkoxide group, x is an integer equal to 0, 1 or 2, multidentate is a bidentate, tridentate or tetridentate ligand containing nitrogen, sulfur, phosphorus and/or oxygen as coordinating atoms to the metal, L is an olefin-based material and NCA is a non-coordinating anion; or the matrix is

represented by a formula (Multidentate)  $MR_xL$ , wherein M is a Group 4 or 6 or 8 or 9 or 10 metal, R is hydride, alkyl, silyl, germyl, aryl, halide or alkoxide group, x is an integer equal to 0, 1 or 2, multidentate is a bidentate, tridentate or tetridentate ligand containing nitrogen, sulfur, phosphorus and/or oxygen as coordinating atoms to the metal and L is an olefin-based material; or the matrix is represented by a formula  $(Cp^1)_x(Cp^2)_yMR_xL+[NCA]$ , wherein M is a lanthanide or an actinide metal, R is hydride, alkyl, silyl, germyl, aryl, halide, alkoxide, amide or solvent ligand, R may also be a bidentate ligand containing nitrogen, sulfur, phosphorus and/or oxygen, x = 0-2, y = 0-2, L is an olefin-based material and NCA is a non-coordinating anion.

14. (withdrawn per restriction): The process according to claim 7, wherein the polyolefin is prepared in a reactor system selected from the group consisting of gas phase reactors, slurry phase reactors and solution phase reactors and combinations thereof.

15. (withdrawn per restriction): A coating process comprising depositing the matrix of claim 1 on a substrate and polymerizing olefin monomer to produce a polyolefin coated surface, object or particulate.

16. (withdrawn per restriction): The process according to claim 15, wherein the substrate is selected from the group consisting of clays, micas, silicates, metals, polymer particles, non-metal oxides, organometallic oxides and inorganic oxides.

17. (withdrawn per restriction): A process for preparing a composite of substrate and polyolefin in-situ using the matrix of claim 1 in combination with at least one substrate.
18. (withdrawn per restriction): The process according to claim 17, wherein the substrate is selected from the group consisting of clays, micas, silicates, metals, polymer particles, non-metal oxides, organometallic oxides and inorganic oxides.
19. (withdrawn per restriction): The process according to claim 17, wherein polyolefin properties are modified.
20. (withdrawn per restriction): A process for the production of hydrophobically modified particles in the form of spheres, surfaces and objects in which the catalytic matrix is disposed on the surfaces thereof.